

The physical optics method for light scattering on large nonspherical atmospheric particles

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In many tasks, when modeling a large fraction of aerosol, dust particles, and atmospheric ice particles, the model of spheroidal particles is used. Such an approximation is very well applicable for small particles which size does not significantly exceed the wavelength of the incident radiation. However, for a large fraction of the aerosol and atmospheric particles, which dimensions are several times larger than the radiation wavelength, this approach is not always correct. In particular, the model of spheroid particles poorly reproduces the polarization characteristics obtained in the real observations.

In this talk we present the physical optics method [1], which is a development of the geometric optics approximation [2] by taking into account the diffraction and interference. Using this method, a solution was obtained for the problem of light scattering on particles which size is several times larger than the wavelength of the incident radiation. Calculations were carried out for particles with random shape. The dataset of the solutions can be used to interpret the results of polarimetric observations.

References

- [1] Borovoi, A., A. Konoshonkin, and N. Kustova, 2014: The physical-optics approximation and its application to light backscattering by hexagonal ice crystals. *J. Quant. Spectrosc. Radiat. Transf.* **146**, 181–189.
- [2] Konoshonkin, A. V., N. V. Kustova, and A. G. Borovoi, 2015: Beam-splitting code for light scattering by ice crystal particles within geometric-optics approximation. *J. Quant. Spectrosc. Radiat. Transf.* **164**, 175–183.

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